Glaser

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE

HERO

(Hazards of Electromagnetic Radiation to Ordnance)

While electromagnetic radiation has been responsible for many miracles in radar, it also has its seamy side. The same concentration of electromagnetic energy that can detect an aircraft or cook a hot dog by remote control can also fire squibs, detonate detonators, or raise the human temperature well above the usual 98.6°F.

Because of the vast amount of radio and radar transmitting equipment aboard ships and at shore stations, strong, local, electromagnetic fields are created. Ordnance items must, of necessity, enter this environment sometime during their trip from stockpile to target. Weapons use electro-explosive devices - abbreviated EED to ignite the propellant, initiate the self-destruct, separate the stages of missiles, and perform other functions. Depending upon the complexity of the weapon, anywhere from one to a hundred different EEDs are used in modern weapons. The EED is a small electric heater embedded in a temperature-sensitive explosive and normally actuated from a firing circuit. These items, the EEDs, are the main culprits that make a missile or weapon hazardous. When a missile or weapon is in an electromagnetic environment, stray rf currents may be induced into the firing circuit to the EED causing it to initiate prematurely--thus possibly detonating the weapon.

Because of the Navy's increasing needs in communications, guidance, search, and navigation, transmitters are becoming more powerful in output and the useful frequency spectrum is being expanded. As transmitting equipment becomes more powerful and as missile systems use increasingly more sensitive EEDs, the problem will become greater unless remedial measures are undertaken now.

The two main avenues of approach to overcome this problem are:

(1) cease transmitting when missiles or weapons are being handled, or

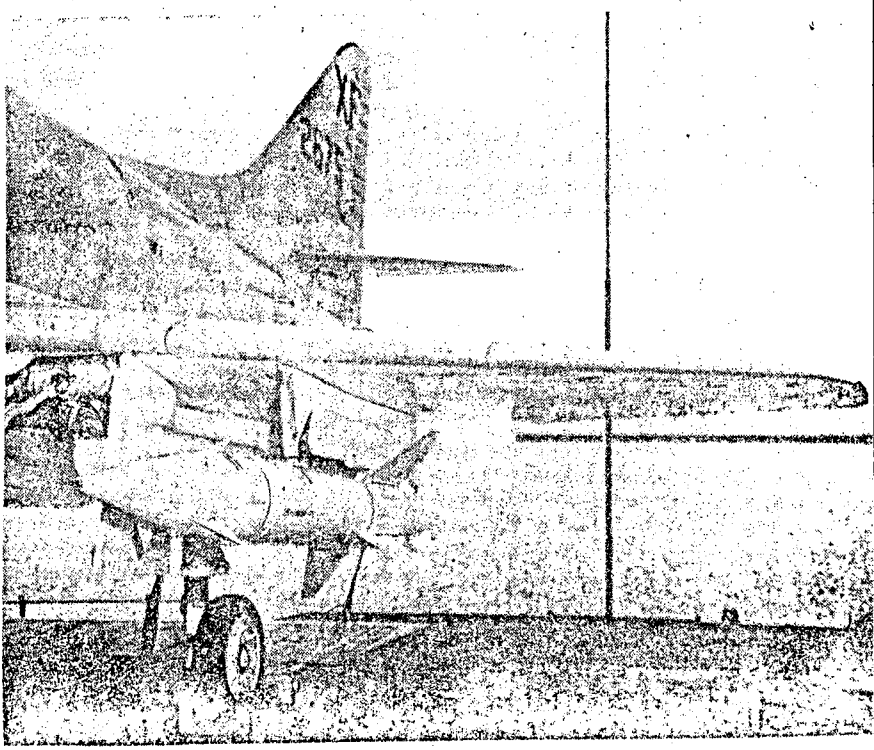
(2) "fix" the missile or weapon so that stray currents cannot be induced into the EEDs. The fleet's strike

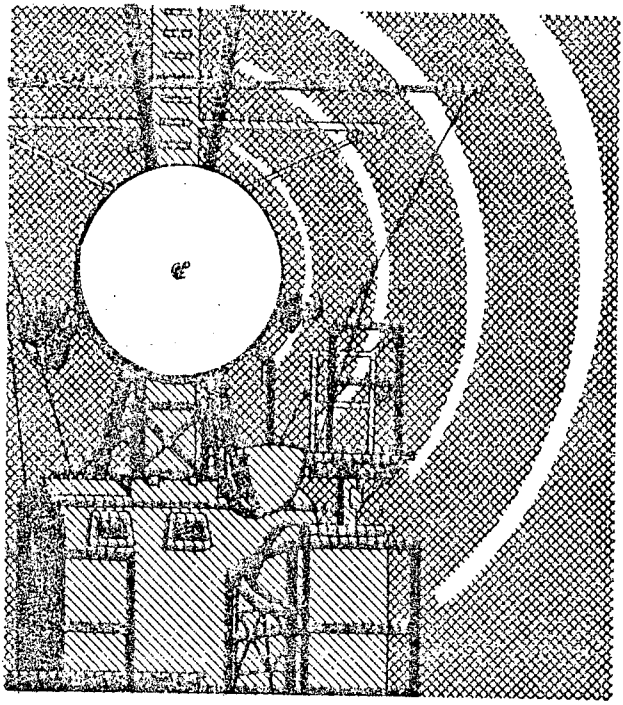
BULLPUP missile undergoes HERO test on FJ-4B aircraft aboard the USS BON HOMME RICHARD.

capability would be greatly deterred if transmitting operations had to be curtailed at any time. Therefore, it is imperative that the missile or weapon be "fixed" to preclude any hazardous condition.

The Navy's HERO (Hazards of Electromagnetic Radiation to Ordnance) program was established by the Bureau of Naval Weapon to define the hazardous areas; perform supporting research for and develop general fixes for existing weapons; and to provide guides that ordnance design engineers can use to design future rf proof weapons. In 1958 the Naval Weapons Laboratory, Dahlgren, Virginia, was assigned technical direction of the HERO program.

The results of this study will be as important to the designer of electronic equipment (who wishes to restrict hazards as much as possible) as they are to the designer of ordnance equipment (who wants no hazards at all). HERO will help to provide weapons that are destructive only to the enemy.





The HERO display shows some of the instrumentation used in experimental testing of radio frequency energy transmissions aboard ship and at shore installations. Rf energy from a transmitter operating at 143.70 mcs is picked up by a typical rocket mounted on a simulated aircraft wing. Photographic bulbs are illuminated by this rf energy, simulating effect on electroexplosives devices contained in the weapon. A miniature tape recorder, located within the rocket, gathers test data. This data is then converted to a strip chart or to a meter for analysis.

Naval Weapons Laboratory

DAHLGREN, VIRGINIA